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AIR DE-CONTAMINATOR

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Fig. 1.

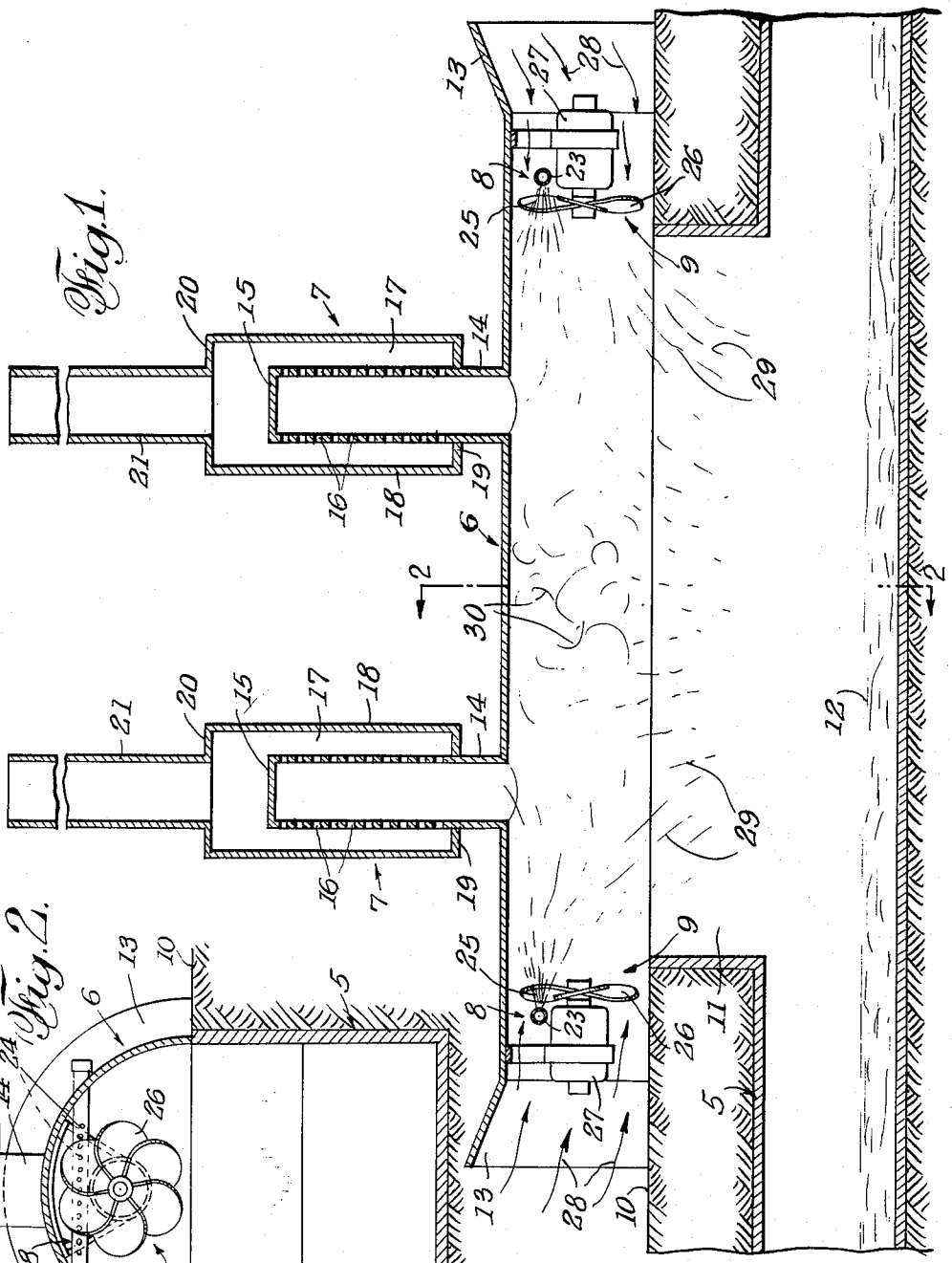


Fig. 2.

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AIR DE-CONTAMINATOR

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This invention relates to apparatus for cleaning or de-contaminating atmospheric air and is a continuation-in-part of my pending application Serial No. 718,525, now abandoned, filed March 3, 1958.

An object of the present invention is to purify atmospheric air by producing an agitated mist of said air and water and gravitationally separating the washed air from the contaminated water that may be directed to sewage disposal.

Another object of the invention is to draw the atmosphere through a spray of water and then to so thoroughly agitate the same that foreign particles in the air become wetted and too heavy to rise in the atmosphere which, thereby, is cleansed.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawing merely shows and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawing, like reference characters designate similar parts in the several views.

Fig. 1 is a longitudinal sectional view of air de-contaminating apparatus showing a preferred embodiment of the present invention.

Fig. 2 is a cross-sectional view as taken on line 2—2 of Fig. 1.

The air-decontaminating apparatus that is illustrated comprises, generally, a storm drain 5, an elongated end-open horizontal enclosure 6, preferably above ground, and covering the storm drain 5, a pair of air and impurity risers 7 spaced longitudinally along the enclosure 6 and receptive from opposite ends of said enclosure of atmospheric air drawn into the enclosure, means 8 to spray water across each end of the enclosure, and means 9 to intermix said water and air entering the enclosure and direct the same, in the form of a mist, toward the middle of the enclosure.

The storm sewer 5 is of conventional construction and may be positioned below the ground surface 10, as shown, or may comprise an open ditch. In either case, the storm sewer is provided with an opening 11 to the surface 10 to expose water flow 12 in the drain from above and serving as a subsurface outlet vent for the enclosure 6.

The enclosure 6 is shown as an elongated duct or passageway disposed on the ground surface 10 and overstanding the drain opening 11. In practice, said enclosure is perferably longer than opening 11 and the flared ends 13 of the enclosure are, in part, defined by the ground surface 10. It will be noted that the enclosure 6 has a half-round cross-sectional form which, while preferred, may

be varied. The flared ends 13 enhance movement of atmospheric air into the enclosure.

Each riser 7 comprises a vertical tube 14 that opens into the enclosure 6 and is provided with an end closure 15. A multiplicity of perforations 16 in said tube afford limited lateral egress of air or gas, as the case may be, that rise in the tube 14 and are intercepted by the closure cap 15.

Each riser 7 also includes a chamber 17 around the perforated portion of tube 14, the same being defined within an annular wall 18, a lower end annular wall 19 between wall 18 and tube 14, and an upper end annular wall 20 spaced above the closure wall 15. A tubular stack 21 rises from the chamber 17 in vertical alignment with tube 14, said stack being carried by the annular wall 20. Said stack is preferably of such height as to induce draft such as will cause discharge of air through the upper end thereof.

The means 8 is shown as a water inlet pipe 22, at each end, terminating in a preferably capped horizontal pipe 23 that extends across the upper portion of enclosure 6, as best seen in Fig. 2. On the inwardly directed side, each pipe 23 is provided with perforations 24. It will be clear that water under pressure in said pipe 23 will be directed in the form of a spray 25 into the interior of the enclosure.

The means 9 is shown as a fan 26 driven by an electric motor 27 and disposed across the path of the spray 25. By providing the fan 26 with overlapping blades, the same insures an efficient intermix of air drawn into the enclosure in the direction of arrows 28 with the spray 25. By reason of high rotation of the fan, the spray directed against its blades is broken up into a fine mist which joins the air stream and effects the mentioned intermix of air and water.

The arrangement is such as to insure an efficient admixture of water and air whereby the resultant mist or vapor comprises extremely small particles. Those particles that contain contaminants may be larger and heavier than the others and will fall gravitationally, as the same are blown inwardly by the fan. These particles, in the form of a precipitation 29, enter the storm drain 5 through the open top 11 thereof and are drawn away with the flow 12.

The finer, lighter particles, from opposite ends of the enclosure 6, will commingle at 30 in the middle area between the risers 7. Since this turbulent flow of mist is subject to the cooling effect of the flow 12, which takes effect through the drain opening 11, an efficient fall-out of contaminants in this turbulence occurs, the same joining the flow 12, as before. Thus, the enclosure between its ends 13 and the middle thereof has residual flows of mist that are light enough to rise in the risers 7 since they are subject to the draft in said risers.

The mist particles will be intercepted by closure 15 and be directed laterally through perforations 16. Such collection of the vapors that occurs by this lateral movement will precipitate in chamber 17 and eventually will drain back through tube 14 into the enclosure 6 from which the same will fall into the flow 12 of the storm drain. The lighter, drier air particles that become separated in chamber 17 from the wetted, liquid-bearing particles are drawn upwardly in stack 21 and exit from the stack as clean air.

It will be realized that the closure 15 and the annulus 20 serve as interceptors that increase the air-freeing effects obtained and, therefore, the efficiency of return to the enclosure 6 of any contaminant particles of mist. Such returning particles may again become subject to action of the mist produced by the means 8 and 9 but the end result is the deposit of all contaminants into the storm drain and release from the stacks of only pure air.

The capacity to move and clean air by the apparatus

will depend largely on its size and the same may, of course, be designed to move and clarify millions of cubic feet of atmospheric air per hour of operation.

While the foregoing specification illustrates and describes what I now contemplate to be the best mode of carrying out my invention, the construction is, of course, subject to modification without departing from the spirit and scope of my invention. Therefore, I do not desire to restrict the invention to the particular form of construction illustrated and described, but desire to cover all modifications that may fall within the scope of the appended claims.

Having thus described my invention, what is claimed and desired to be secured by Letters Patent is:

1. The combination of an elongated open-ended enclosure having an elongated subsurface vent that is open above a flow of water therepast, means at each said open end to draw contaminant-containing atmospheric air into the enclosure, means to embody said air flow into sprays of water directed inwardly toward the middle of the enclosure, said airborne sprays commingling turbulently above said vent and subject to cooling by the flow of water below said open vent to cause precipitation of the large spray-wetted contaminants in the air flow into the vent, riser means carried by the enclosure, one on each side of the area of turbulence, and means in the riser means to separate the air and the contaminants therein from each other, and which riser means rise from the enclosure, said riser means including stacks to draw the air upwardly and outward.

2. The combination according to claim 1 in which the riser means includes passages to conduct released contaminants back into the enclosure.

3. The combination of an elongated open-ended enclosure having an elongated subsurface vent that is open above a flow of water therepast, means at each said open end to draw contaminant-containing atmospheric air into the enclosure, means to embody said air flow into sprays of water directed inwardly toward the middle of the enclosure, said air-borne sprays commingling turbulently above said vent and subject to cooling by the flow of water to cause precipitation of the large spray-wetted contaminants in the air flow into the vent, a riser between the middle and each end of the enclosure, each riser comprising a vertical perforated and end-closed tube extending upwardly from and receiving flow of spray-wetted air from the enclosure, a chamber around each tube and receptive of lateral flow through the perforations of the respective tubes, and a stack-extending upwardly from each chamber and producing a draft to draw up and out the drier particles of air circulating in said chambers.

4. Air de-contaminating apparatus comprising a horizontal, elongated and open-ended enclosure, means at each end of the enclosure to draw contaminant-containing atmospheric air into the enclosure, means to incorporate said air and its contaminants into sprays of water directed inwardly toward the middle of the enclosure, said air-borne sprays commingling turbulently in the enclosure and causing some of the heavier particles of spray to fall out of the turbulent flow, riser means carried by the enclosure, one on each side of the area of turbulence, and means in the riser means to separate the air and the contaminants therein from each other, and which riser means rise from the enclosure, said riser means including stacks to draw the air upwardly and outward.

5. Apparatus according to claim 4 in which means is provided inwardly of each source of water spray to effect the mentioned incorporation of water spray and air, said means having moving blades to break the spray into a fine mist.

6. Air cleaning apparatus comprising a generally horizontal enclosure having an open air inlet at each end and a central area of turbulence, two longitudinally spaced vertical, perforated, end-closed pipes extending upwardly from the enclosure one on each side of said area of turbulence, means within the enclosure at each end thereof to draw atmospheric air into the enclosure through its inlets, each means comprising a fan disposed adjacent the inlet end of the duct, and including a set of overlapping fan blades arranged to span the transverse area of the enclosure, means to introduce a spray of water into each air stream moving in the enclosure, said latter means each comprising a spray-releasing member disposed across the enclosure and directing its spray against the inlet sides of the fan blades, and a stack above the closed end of each perforated pipe to draw air from the perforated pipe and discharge the same into atmosphere, moisture from the air stream discharging downwardly from the enclosure.

7. Air cleaning apparatus comprising in combination, an elongated enclosure having a lower outlet, means for directing air to be cleaned into the enclosure from each end thereof, and means to introduce sprays of water with said air, the air from both ends meeting turbulently at the central portion of the elongated enclosure and the turbulence tending to cause droppage of heavy particles from the air together with moisture, said enclosure having a pair of upwardly directed openings at each end of the central portion for withdrawing air and lighter entrained particles from said enclosure, moisture-separating means connected to said upwardly directed openings and outlet stacks connected thereto for purified air.

References Cited in the file of this patent

UNITED STATES PATENTS

434,119	Rutzler	Aug. 12, 1890
960,686	Oldham	June 7, 1910
1,796,405	Schobrone	Mar. 17, 1931
2,256,507	Weber et al.	Sept. 23, 1941
2,547,190	Wilson	Apr. 3, 1951
2,608,398	Park et al.	Aug. 26, 1952
2,732,192	Johnson et al.	Jan. 24, 1956

FOREIGN PATENTS

49,115	Germany	Oct. 17, 1889